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**Dynamic Rayleigh-Taylor instability\***

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The Rayleigh-Taylor (RT) instability occurs in many situations in inertial confinement fusion and astrophysics, but often in a non-steady-state setting. The temporal evolution of the interface acceleration and material parameters can affect the instability development in a fundamental way. We have studied the evolution of the RT instability in a layered package driven by an x-ray radiation drive at ~30 Mbar pressure. We combine the results of the 1D radiation-hydrodynamics code HYADES with an analytic description of the instability to demonstrate the dynamic stabilization of a perturbed interface due to shock reverberations. Comparisons with experimental results taken on the Nova laser will be presented. \*Work performed under the auspices of the U.S. Department of Energy by the Lawrence Livermore National Laboratory under Contract W-7405-ENG-48.